mechanically analogous to the whirls that may be seen floating down stream in any deep and rapid river or to the standing waves behind the stones in a shallow river or to the spots of steady and unsteady flow of water through a long tube. All these periodicities originate within the atmosphere and are due to its internal mechanical conditions, not to the influence of external conditions, such as periodicity in solar radiation.

All the measurements made with the pyrheliometer or actinometer during a century past unite in showing appreciable variations in the quantity of heat received from the sun. But in no case have we been able to show that the variations take place at the sun itself. On the contrary, they have most plausibly been traceable back to variations in the gases, moisture, and dust of our own atmosphere. If there are general variations in the temperature or rainfall or pressure on different portions of the earth's surface, we must attribute these to what is going on on the earth's surface, not on the sun's surface. During the interval between August, 1902, and March, 1903, reports have come from several portions of the world indicating peculiar local conditions; thus, for instance, both Henri Dufour, in Switzerland, and H. H. Kimball, at Asheville, N. C., report an apparent diminution in the solar radiation as measured by the best actinometers. This may easily be accounted for by the presence of an extra quantity of moisture or haze or even volcanic gases in the atmosphere above their stations. Such changes in the atmospheric constituents may be due to changes in the general circulation of the atmosphere in the respective portions of the globe. But the latter changes must be accompanied by special phenomena in other parts of the globe. Accordingly we find quite anomalous winter conditions, namely, a mild winter and a cold spring over the United States and Canada, a long-continued drought in Australia, heavy ice and storms in the North Atlantic, unusual snows and cold weather in Austria and Germany, great typhoons in the Pacific, and so on for other regions. This whole series of atmospheric phenomena is connected together; an unusual event in one region brings corresponding phenomena in another, while, for aught we know, the atmosphere as a whole may preserve the same average temperature, moisture, and motion. We must seek for the initial disturbance in our atmosphere and on our earth. We need not go far away to study the sun and its possible variability of radiation or the moon and its tidal influence until we have mastered the intricacies of our terrestrial conditions. It is not wise to devote much time to the study of the minute atmospheric variations that may possibly result from possible variations in external influences while the great variations—the droughts and floods, the monsoons and storms inherent to all atmospheric processes—are still awaiting profound study. Solar physics and molecular physics certainly have important applications to meteorology, but the mechanics of the atmosphere is the important study for the meteorologist, and we earnestly invite the young American students of science to undertake this important subject.

CHAVANNE'S TEMPERATURE AND RAINFALL IN ARGENTINA.

We have already, in the MONTHLY WEATHER REVIEW for June, 1902, page 315, referred to the great work being done by Mr. Walter G. Davis for the whole of Argentina. He has published many volumes of climatological data and also an elaborate general climatological report in the first volume of the Second Official National Census. Lately he began the publication, for the Argentine Department of Agriculture, of a daily weather map, which may be considered as a national extension of the daily map of Buenos Ayres published for the last ten years by the Observatory of La Plata.

We recently received from Dr. Josef Chavanne an important memoir on the temperature and rainfall of Argentina, which lately appeared in the first volume of the Publications of the German Academic Association at Buenos Ayres. Dr. Chavanne has been known for many years as a prominent student of meteorology and geography. He was born in Gratz in 1846 and traveled extensively in America and Africa; his previous memoirs have been published by the geographical, meteorological, and other societies in Vienna. It was with great pleasure that we welcomed this memoir on the climate of Argentina, as indicating the addition of another trained climatologist to the able men who have, for some years, been located in that republic. But, while compiling this notice of his latest work, we have been pained to learn, by a letter from Madame Chavanne that her husband died on December 7, 1902, the very day on which his memoir was received in Washington.

Dr. Chavanne begins his memoir by emphasizing the ease with which European emigrants adapt themselves to the climate of Argentina, which can now be studied in detail by means of the records of about 400 stations and especially since the topographic maps of the republic now possess a sufficient degree of accuracy. Chavanne notes that previous studies have often led to erroneous conclusions because the data related to different years at different stations. He has, therefore, reduced all of his rainfall records to the fundamental 40-year period, 1861–1900, and his temperature records to the fundamental 45-year period, 1856–1900. For the purpose of comparison with the stations in Chili, he reduces the latter to the 30-year period, 1861–1890; but the other foreign stations are reduced to the same fundamental period, 1856–1900, as that adopted for Argentina. The temperature and rainfall for the year and the four seasons, as well as the ranges of temperature, the anomalies of temperature and the characteristic of the vegetation covering the surface, are also shown in charts, so that we have a decided addition to our knowledge of the relation between climate and vegetation.

Chavanne's climatic charts of Argentina extend from latitude 22° southward to 55°, and partially include the western or Chilian coast. He considers the climate to be not only primarily influenced by the sunshine but to have an additional annual period depending upon the alternating prevalence of the warm Brazilian and the cool Falkland currents on the east coast, the increasing elevation as we go westward up to the Andes, the prevalence of the cold Peru current on the coast of Chili, and the variable characteristics of the surface, as modified by vegetation.

This complex of climatological factors brings about a subdivision of the Argentine territory into five general climatic subregions, three of which should be again subdivided into two. These nine regions are as follows:

1. Northern coast, a subtropical climate having mean daily temperatures above 20° C. (68° Fahr.) for from five to seven months and above 10° C. (50° Fahr.) for the rest of the year.

2. Southern coast, temperate climate; mean daily temperatures above 10° C. during eight to twelve months.

3. Northern interior, subtropical climate; temperature above 20° C. during five to eight months and the rest above 10° C.

4. Southern interior, temperate climate; temperatures above 10° C. during eight to twelve months.

5. The region of the steppes and the so-called local zondas, subtropical climate; temperatures above 20° C. during five to seven months, the rest above 10° C., but having a temperate or even a cold climate at locations whose altitudes exceed 1500 meters.

6. The northern Andean region, having a temperate climate at altitudes of 1300-3600 meters, with temperatures above 10° C. during eight to twelve months, but having a subtropical climate for localities below 1300 meters.

7. The southern Andean region, having a temperate climate up to altitudes of 1800 meters with temperatures above 10 C°

during six to nine months, but a cold climate at altitudes above 1800 meters, with temperatures above 10° C. during one to three months.

8. The eastern Patagonian region, temperate climate, with temperatures above 10° C. during four or five months.

9. The western Patagonian and Staten Island region, a cold climate, having temperatures above 10° C. during one to five months according to the altitude and longitude. Staten Island has no month with mean temperature above 10° C.

THE ZONDAS.

In the course of his more detailed remarks on the peculiarities of each of these climatic regions Dr. Chavanne mentions the zondas as a special characteristic of the elevated steppes. These are local hot winds, whose origin and effects are due to the local topography, the general configuration of the orography and the peculiarities of the surface of the land, as to the amount of sand, clay, and boulders. They occur with great frequency and regularity in the summer months and in the afternoon hours, often blowing with the strength of a gale or storm; during their prevalence the temperature rises by from 10° to 19°, while at the same time the relative humidity sinks to 0 per cent.

[It is evident that here we have to do with a phenomenon analogous to the hot, dry winds of Kansas and Nebraska. These are exaggerated or intensified illustrations of the foehn winds of Switzerland, the chinook winds of Montana, and of the afternoon gale that descends from Table Mountain into the streets of Cape Town. The temperature of the ground does not add much to the temperature of these winds; the latter is due primarily to the compression and dynamic warming of air forced down from moderate heights in the atmosphere; the hot winds descend as well during the night as during the day. The time when, the place where, and the reason why they descend is not yet clearly understood.—ED.]

TEMPERATURE GRADIENT.

A study of the diminution of temperature with altitude shows that on the average for all these surface stations the vertical temperature gradient ranges between 0.55° C. and 0.20° C. per 100 meters, the general average being 0.35° C. The diminution of temperature with latitude is on the average much larger in the eastern portion of the republic and at sea level, where it amounts to about 0.6° C. per degree of latitude; it is much less in the western or mountainous regions, where it amounts to 0.21° C. per degree of latitude.

Chavanne's detailed tables of temperature and rainfall will probably furnish an excellent guide for the selection of plants intended for importation into or export from Argentina. They will also serve as a basis for special phenological studies.

THE WEATHER IN VENEZUELA.

Mr. E. H. Plumacher, United States Consul at Maracaibo, under date of March 19, says:

We are having here very unusual weather. It blows every day with great velocity, but without a cloud in the sky. It seems that in the upper strata a fine dust is moving, which gives the sky a hazy hue. The velocity of the wind is that which is called a "double-reefed topsail" wind. Outside of the bar and in the Gulf of Maracaibo the navigation has been rough and steamers leaving port have had very unpleasant voyages. We have never experienced such weather in this section of Venezuela, and consequently the country is suffering greatly. Since September, 1902, we have not had any rains, and consequently sickness abounds from using bad water. During the first twenty days of this month we have had five slight seismic movements.

THE CUBAN METEOROLOGICAL SERVICE.

Mr. W. C. Devereaux, Observer Weather Bureau, reports from Havana, Cuba, under date of April 11, that the Cuban Meteorological Service was officially inaugurated on that date, at 12 o'clock noon, by the president of the republic, by dropping the time ball. Señor Enrique A. Del Monte is chief of the central station for meteorology, climatology, and crops (meteorologia, climatologia y cosechas), and informs us that, "beginning with April 13, 1903, he will take observations every two hours, from 8 a. m. to 4 p. m., inclusive."

It seems fair to assume that this latter expression relates to complete personal records, including clouds and miscellaneous phenomena, and that the ordinary records of maximum and minimum temperatures and the continuous registers of temperature, pressure, wind, rain, and sunshine will be kept up by means of the proper apparatus, as at all first class stations. Meteorology is indebted to Félipe and Andrés Poey for meteorological records at Havana many years ago, which were at that time deemed among the most elaborate of their kind. Continuous registers have also been maintained at the Colegio de Belen since 1873, by the use of the Secchi meteorograph. We also owe to Señor Del Monte himself the establishment of the meteorological observatory at the Vedado Park and the series of observations published in the MONTHLY WEATHER REVIEW for April, 1900. The advantageous location of the new central meteorological office and the introduction of the newest type of self-registering apparatus will, it is hoped, give increased precision and reliability to the new series of records. As there has not yet been devised any satisfactory continuous register of the ventilated wet-bulb thermometer or of the ventilated dew-point apparatus, we must regard it as a distinct addition to our knowledge of West Indian climates that Señor Del Monte is maintaining a series of personal observations of the moisture of the air at intervals of two hours—from 8 a. m. to 4 p. m.

STUDENT ASSISTANTS IN THE UNITED STATES WEATHER BUREAU.

A recent note from Dr. O. L. Fassig, Section Director, United States Weather Bureau, Baltimore, Md., states that—

Mr. Benjamin L. Miller, who during the past two years has held the position of student assistant in the Baltimore office of the Weather Bureau, has been appointed assistant in geology in Bryn Mawr College. Dr. Miller completed his studies in the Johns Hopkins University in February, 1903, receiving the degree of Ph. D. on February 23.

In addition to instruction in geology at Bryn Mawr, Dr. Miller will give a course of two hours per week throughout the year in meteorology, which has heretofore not been taught as a separate study in this institution.

During the past five years, and in addition to his specific Weather Bureau work, Dr. Fassig has actively maintained a course of instruction in meteorology for the students of the Johns Hopkins University; probably thirty or more post graduates have attended these lectures. Several of these are now giving courses in meteorology in other institutions. The two student assistants annually allowed to the Baltimore office have, we believe, also been students of geology and physics and have attended these meteorological lectures. Although the student assistants of the Weather Bureau generally enter its service, yet we shall not fail to recognize the great importance of the work that they may do outside of the service as teachers of climatology. The future progress of the higher meteorology depends upon securing here and there a man of genius from among the thousands who have studied climatology and meteorology under the earnest teachers of our colleges and universities.

AN ARCTIC MAGNETICAL AND METEOROLOGICAL STATION.

A letter addressed to Dr. L. A. Bauer, of the United States Coast and Geodetic Survey, from Christiania, Norway, dated April 1, from Roald Amundsen, leader of the Norwegian Magnetic North Pole Expedition, states that he will start in May